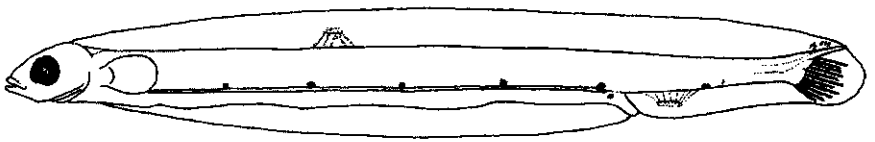
NOAA Technical Memorandum NMFS-SEFSC-511

PRELIMINARY GUIDE TO THE IDENTIFICATION OF THE EARLY LIFE STAGES OF ARGENTINOIDEI FISH FAMILIES ARGENTINIDAE, MICROSTOMATIDAE, AND OPISTHOPROCTIDAE OF THE WESTERN CENTRAL NORTH ATLANTIC



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It will be a chapters entitled Argentinoidei, Argentinidae, Microstomidae, and Opistoproctidae in "The early life history stages of fishes of the western central North Atlantic".

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As currently understood, the sub-order Argentinoidei generally includes four families, the Argentinidae, Bathylagidae, Microstomatidae, and Opisthoproctidae (Begle 1992). Most argentinoids are meso- to bathypelagic in oceanic waters over the outer continental shelf and slope. In members of the Argentinoidei, the dorsal and anal fins develop in the median finfold (rather than along the body wall as is typical of most teleosts) and are connected to the trunk by a series of hyaline strands (Ahlstrom et al. 1984). The pectoral fins develop first, followed by the caudal, dorsal and anal, and pelvic fins. All argentinoids have a deflected terminal gut that hangs free from the body. All regional members of the Argentinoidei have 15 or fewer dorsal rays, and most have fewer than 15 anal rays and an adipose fin. The Argentinoidei have distinctive early life stages with eggs and larvae known for most argentinids, some microstomatids and bathylagids, but few opisthoproctids. Larvae of the Argentinidae and Bathylagidae are slender, those of Microstomatidae are deeper-bodied, and Opisthoproctidae have both slender and deep-bodied forms. Transformation from the larva to demersal juvenile is protracted in most argentinoids, with pelagic juveniles often retaining their larval pigmentation pattern. Morphological changes generally include a deepening of the body, prolongation of the snout, and eye enlargement. Scale development marks the end of the pelagic juvenile phase. The distinctive ELH stages within each family of the suborder Argentinoidei are unlikely to be confused with those of other taxa. Some taxa have confusing names and a few are listed in Table Argentinoidei 1, otherwise species are discussed in family sections. A list of the species (excluding the Bathylagidae that will be treated later) and their meristics are given in Table Argentinoidei 2.

Table Argentinoidei 1. Synonyms for members of the osmeriform suborder Argentinoidei from the western central North Atlantic, data from Eschmeyer 1998

Family	Common name	Valid name and spelling	Synonyms
Argentinidae	Atlantic argentine	*Argentina silus*	*Salmo silus*
		Microstoma microstoma	*Microstoma rotundata*
Opisthoproctidae	Brownsnout spookfish	*Dolichopteryx brachyrhynchus*	*Bathylychnops brachyrhynchus*
		Dolichopteryx longipes	*Aulostoma longipes*
		Rhynchohyalus natalensis	*Hyalorhynchus natalensis*

Table Argentinoidei 2. Meristic data for fishes in the suborder Argentinoidei (except Bathylagidae) from the western North Atlantic. 'NA' indicates no information available.

Species	Vertebrae	Dorsal rays	Anal rays	Pectoral rays	Pelvic rays	Caudal rays (primary+procurent)	Gill rakers (upper+lower or lower only) (+1 at angle in some taxa)	BR	Pyloric caecae	Source
Argentinidae										
Argentina										
brucei	45(44-46)	11(10-12)	(11)12-13	18-19(20)	13-14	19 primary	+7(6)	5	8-10	Cohen & Atsaides 1969
georgei	48(47-50)	11(10-12)	10-11(10-13)	17-18(16-20)	13(12-14)	19 primary	+6(7)	5	8-9	Cohen & Atsaides 1969
silus	64-67	12-13(11)	15-16(13-17)	16-18(15)	12-13	19 primary	6(5-7)+1+12-14(11-15)	6		Schmidt 1906; Moser 1996a Cohen & Atsaides 1969
stewarti	52-53	11(10-12)	12-13	20(18-21)	13-14(15)	19 primary	+6(7)	5	7-9	Cohen & Atsaides 1969
striata	49(47-51)	11-12(10)	12-13(11)	19(18-21)	14(12-15)	10+19+9=38	3(3-4)+6(7)	5	9-14	Cohen & Atsaides 1969
Glossanodon										
polli	?	12-14	11-12(13)	21-22(19-22)	11-12(13)	19 primary	10+1+20-23	5		Cohen 1958
pygmaeus	43-44	11(10-12)	12(11-13)	13(12-14)	10(10-12)	19 primary	10(9-11)+1+22(21-23)	5	8-9	Cohen 1958
Microstomatidae										
Microstoma										Schmidt 1918; Sanzo 1931a
microstoma	44-47	11-13	7-9	7-8	10(9-11)	11+19+11=41	6+1+14	3-4	7	Cohen 1958a; Cohen 1964
*Nansenia**										
longicauda	47-50	10-11	10-11	13-14(11-14)	10-11(9)	19 primary	7-8+1+15-18=23-27	4		Moser & Butler 1996
megalopa										
pelagica	38-39	9-10	8-9	9-10(11)	10-11	19 primary	10-13+1+24-27=36-41	4	7-8	Moser & Butler 1996
Xenophthalmichthys										Bertelsen 1958
danae	ca. 50	10-12	8-9(10)	7	8-9	10+19+9=38		3	6	Ahlstrom et al. 1984
Opisthoproctidae										
Dolichopteryx										
binocularis	~57-58	13-15	11	13-14	7-9	13+19+13=45		2		Beebe 1932; Beebe 1933
brachyrhynchus	58	10	11	13	8	19 primary		2		Moser 1996d
longipes	41-44	11(10-11)	8-9(10)	11-13	8-9	9-14+19+9-11=40-45		2	4	Beebe 1933; Ahlstrom et al. 1984
Opisthoproctus										
grimaldii	?	12-14	8	11	10	19 primary	20	2		Ahlstrom et al. 1984
soleatus	31	11(10-12)	13-14	9-11	9(10)	19 primary	12	2		Ahlstrom et al. 1984
Rhynchohyalus										
natalensis	?	10-12	8-10	18-20	11-12	19 primary	6+17	4		Masuda et al. 1984; Moser 1996d
Winteria										
telescopa	33-36	8-9	7-9	12-14	7-10			3		Masuda et al. 1984

* *Nansenia* not likely in our area (Kawaguchi & Butler 1984)

ARGENTINIDAE: Argentines or herring smelts

By J. G. Ditty

Adults of the family Argentinidae are silvery and laterally-compressed, with large eyes, a small mouth, toothless jaws, and strong, recurved teeth on the tongue. The pelvic fins are located near mid-body, the anal fin is located far posteriad below the adipose fin, and the caudal fin is forked. Adults are usually <22-cm SL (Moser 1996c). Argentinids have a straight gut that extends to about mid-body and is lined with transverse rugae for most of its length. The head is relatively small with a rounded, blunted anterior profile. Larval pigmentation usually consists of a series of 6-8 bands or patches of pigment ventro-laterally along the trunk and ends with pigment on the tail. There are five species of *Argentina* and one species of *Glossanodon* in our area (Clarke 2002), but ELH stages are only known for eggs & larvae of *A. silus*, juvenile stages of *A. striata* and *G. polli*. A species account is provided for *A. silus* and an illustration of *G. polli* juvenile is shown in Figure Argentinidae 1. Meristic and distribution characters are given for the family in Table Argentinoidei 2 & Table Argentinidae 1, respectively. Species accounts and illustrations are provided for *Argentina silus, A. striata*, and *Glossanodon polli*.

Table Argentinidae 1. Geographic distribution and habitat of the species of the Family Argentinidae

Species	Distribution	Habitat
Argentina		
brucei	Caribbean & Panama south	Meso- to bathypelagic usually 150-1500 m over mud bottoms
georgei	Atlantic coast of Florida, Dry Totugas, Caribbean Sea	Meso- to bathypelagic usually 250-450 m over mud & shell bottoms
silus	Northern-most part of the study area	Meso- to bathypelagic usually > 150 m
stewarti	Jamaica & Nicaraugua south through southern Caribbean	Meso- to bathypelagic usually 350-550 m
striata		
Glossanodon		
polli		
pygmaeus		

MERISTICS

Vertebrae	
Precaudal	
Caudal	
Total	64-67
Fin rays	
Dorsal	12-13(11)
Anal	15-16(13-17)
Pectoral	16-18(15)
Pelvic	12-13
Caudal	
Principal	19
Adipose Fin	Yes
Gill rakers on first arch	
Upper	6(5-7)+1 angle
Lower	12-14(11-15)
Total	usually 19-21
Branchiostegals	6

LIFE HISTORY

Range: northern-most part of study area
Habitat: meso- to bathypelagic in oceanic waters usually below 150-m deep
ELH pattern: oviparous; pelagic larvae
Spawning Season: spring

LITERATURE

Ahlstrom et al. 1984, Cohen 1964, Cohen & Atsaides 1969, Moser 1996c, Schmidt 1906.

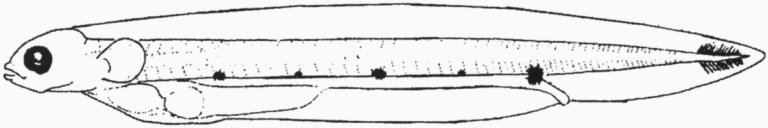
EARLY LIFE HISTORY DESCRIPTION

EGGS:
Diameter: 3.0-3.5 mm
No. of oil globules: one
Oil globule diameter: 0.95-1.16 mm
Yolk: segmented
Shell: smooth
Hatch size: 6-9 mm

LARVAE:
Length at flexion: ~28-35 mm
Length at transformation: >50-mm
Sequence of fin development: P_1, C, D & A, P_2
Pigment: by 17-mm, a characteristic row of 5-6 pigments above gut, & 1 ventrally along caudal peduncle; pigment above & below notochord tip
Diagnostic: long, slender body; voluminous finfold; series of pigments above ventrolaterally above hindgut; from other argentinids by the high vertebral and median fin ray counts; 6 branchiostegal rays

ILLUSTRATIONS

A). 16.3 mm, B) 19.0 mm, C) 28.0 mm, D) 39.0 mm, E) 50.0 mm SL all redrawn from Schmidt 1906 (see Fahay 1983).



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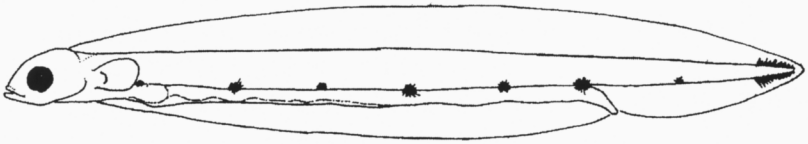

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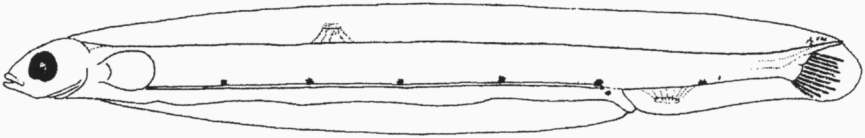

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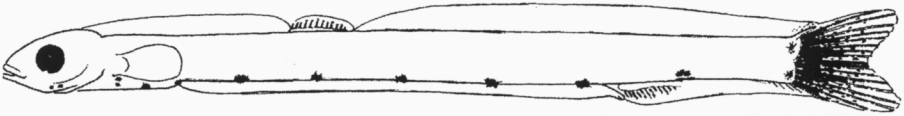

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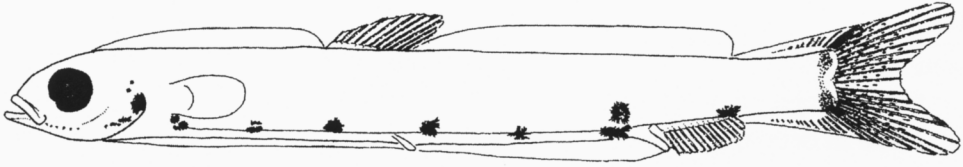

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MERISTICS

Vertebrae	
Precaudal	
Caudal	
Total	49(47-51)
Fin rays	
Dorsal	11-12(10)
Anal	12-13(11)
Pectoral	19(18-21)
Pelvic	14(12-15)
Caudal	
Dorsal Secondary	10
Principal	19
Ventral Secondary	9
Total	38
Adipose Fin	Yes
Gill rakers on first arch	
Upper	3(3-4)
Lower	6(7)
Total	9-10
Branchiostegals	5

LIFE HISTORY

Range: throughout area .
Habitat: meso- to bathypelagic in oceanic waters usually 150-450 m deep over mud bottoms.
ELH pattern: oviparous; pelagic larvae
Spawning: unknown.

LITERATURE

Ahlstrom et al. 1984, Cohen 1964, Cohen & Atsaides 1969.

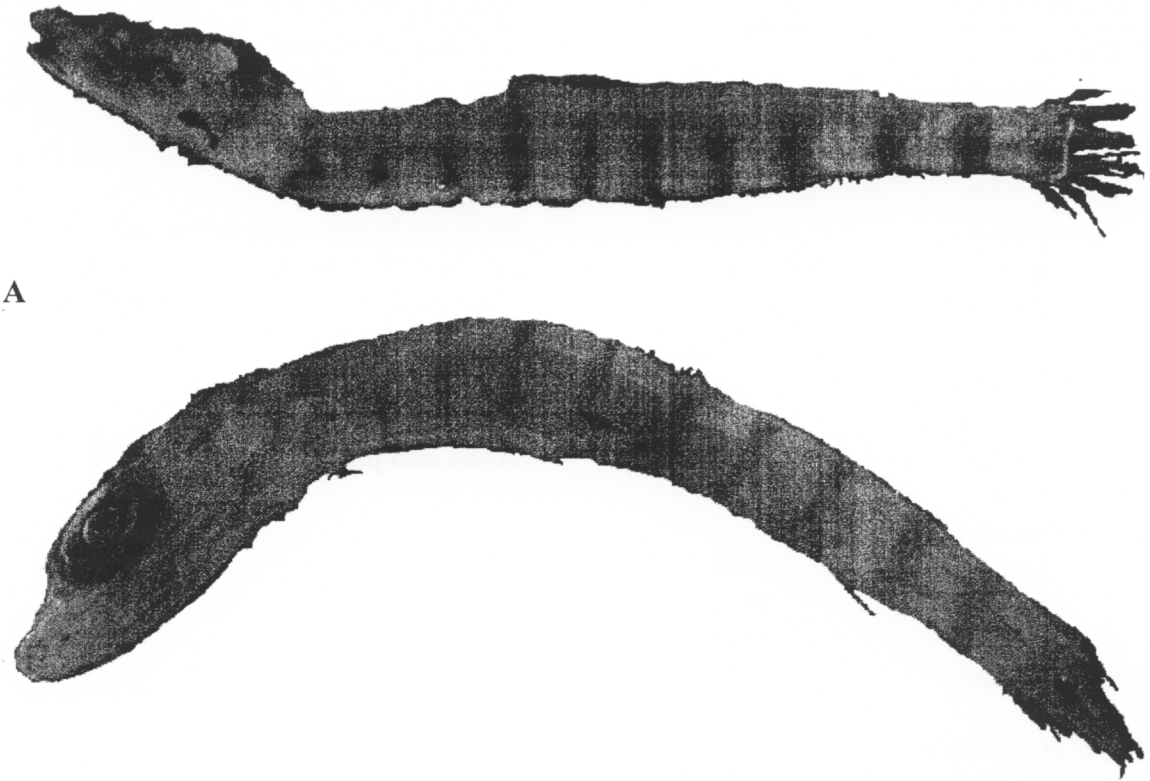
EARLY LIFE HISTORY DESCRIPTION

EGGS: undescribed.

LARVAE: undescribed
Sequence of fin development: P_1 ,C, D & A, P_2
Pigment: In juveniles, pelvics heavily-pigmented; 11 transverse stripes along body, one on opercle and another across caudal fin; last 7 stripes continuous around ventral side of body but not across dorsum.

ILLUSTRATIONS

a) Juvenile ca. 20 mm SL, MCZ 66011; B) Juvenile ca 37 mm SL, MCZ 41865,



A

B

MERISTICS

Vertebrae	
Precaudal	
Caudal	
Total	Unknown
Fin rays	
Dorsal	12-14
Anal	11-12(13)
Pectoral	21-22(19-22)
Pelvic	11-12(13)
Caudal	
Principal	19
Total	
Adipose Fin	Yes
Gill rakers on first arch	
Upper	10+1 angle
Lower	20-23
Total	31-34
Branchiostegals	5

LIFE HISTORY

Range: southern-most part of survey area.
Habitat: meso- to bathypelagic in oceanic waters 275-400 m deep.
ELH pattern: oviparous; pelagic larvae.
Spawning: Unknown

LITERATURE

Ahlstrom et al. 1984, Cohen 1958, Poll 1953.

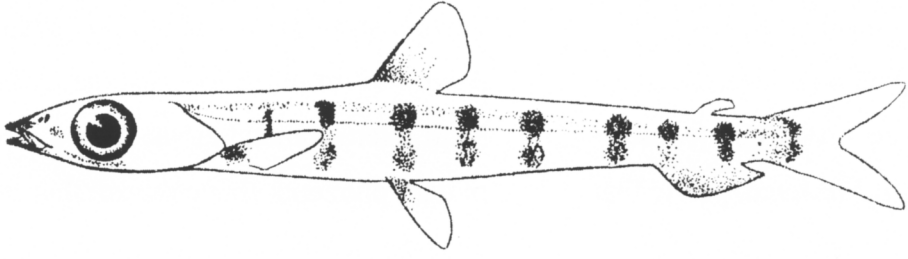
EARLY LIFE HISTORY DESCRIPTION

EGGS: undescribed.

LARVAE: undescribed
Sequence of fin development: P_1, C, D & A, P_2
Pigment: In late stage larvae and juveniles, 8-9 bands laterally along body
Diagnostic: from most argentinids by the number of D & P_1 fin rays.

ILLUSTRATIONS

A) 83 mm juvenile from Poll 1953.



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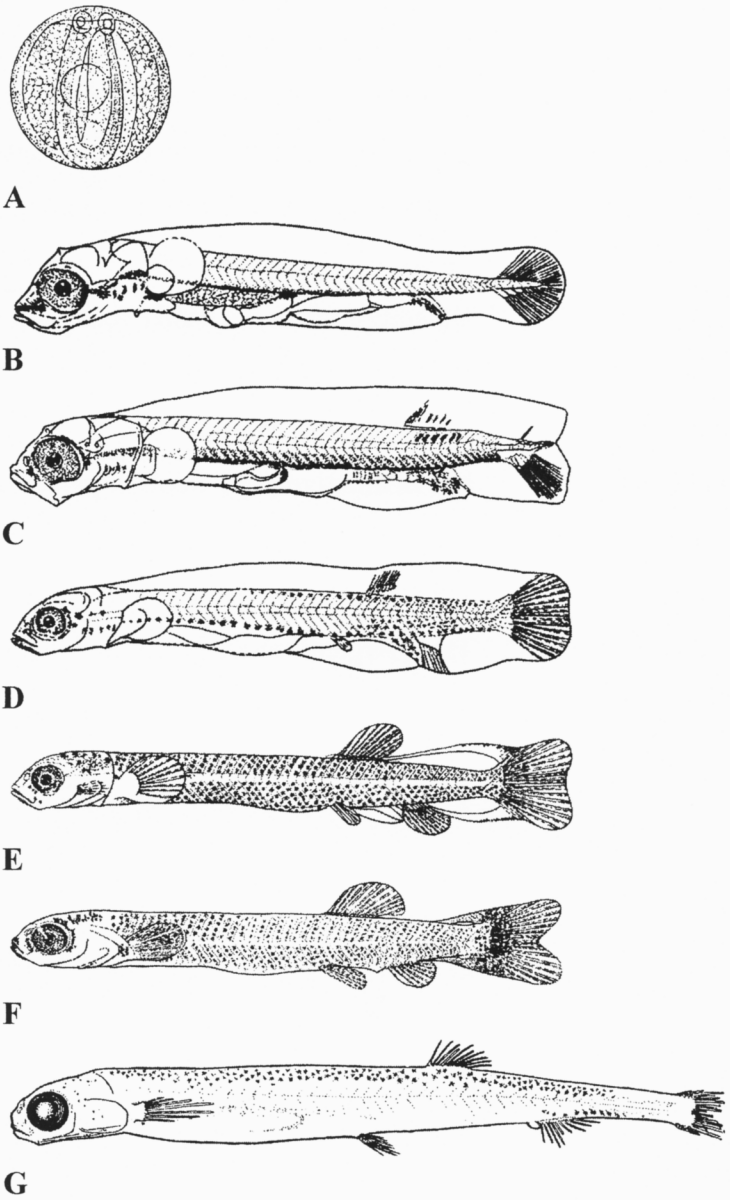
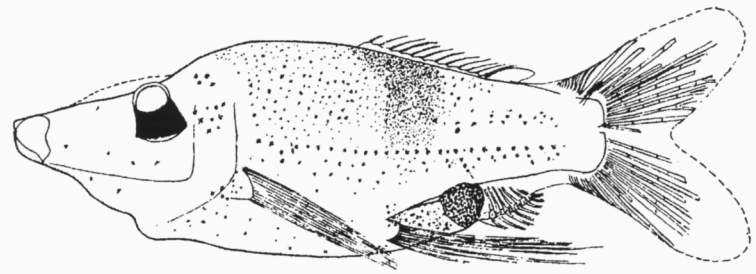
Adult microstomatids are generally slender and silvery with a short blunt snout, and dorsal, anal, and pelvic fins placed at or behind mid-body. Most microstomatids are <20-cm SL (Moser & Butler 1996). In *Nansenia*, pelvic fins are located near the termination of the dorsal fin, whereas *Microstoma* and *Xenophthalmichthys* have pelvic fins placed in front of the dorsal fin origin. Microstomatid larvae have a gut that extends to about 75% of body length and has an elongate S-shaped fold in the gut that lies flat on the left side of the body (Ahlstrom et al. 1984). In microstomatids, the head is bent slightly downward from the longitudinal axis. Most microstomatid larvae have a series of dark pigments above the gut that may extend onto the head and tail. Meristic characters are given in Table Argentinoidei 2. Illustrations of *Microstomus microstomus* eggs, larvae and juveniles are given in Figure Microstomatidae 1.

Figure Microstomidae 1. *Microstomus microstomus*. A) Egg, B) 1.6-mm,; C) 6.2–mm; D) 7.2–mm; D) 12.6–mm; E) 15.6–mm; F) 16.8-mm SL, G) *Xenophthalmichthys danae,* 16.5 mm. 1 A-F redrawn after Sanzo (1931); G from Bertelsen 1958.



Opisthoproctids are highly specialized, relatively rare fishes from oceanic mid-waters that have an elongate or tubular snout, small terminal mouth, and enlarged pectoral or pelvic fins. The pelvic fins are placed near mid-body and most taxa have tubular, dorsally-directed eyes. Opisthoproctids have a general tendency for delayed metamorphosis and paedomorphosis (Moser 1996d). Larvae of slender-bodied opisthoproctids have an elongate gut while deeper-bodied taxa have a relatively shorter gut. All opisthoproctids have a sac-like stomach that exits through a constricted pylorus to the intestine (Ahlstrom et al. 1984). Deeper-bodied opisthoproctids have a relatively larger head with a pronounced hump or bend at the nape (Ahlstrom et al. 1984). Opisthoproctids are easily recognized by their well-developed tubular eyes, and precocious pelvic fins (Moser 1996d), and distinctive pigmentation patterns unique to each genus (Ahlstrom et al. 1984). Meristic characters are given in Table Argentinoidei 2.

Figure Opisthoproctidae 1. Ilustrations of A) Opisthoproctus grimaldi, 14.0 mm; B) Dolichopteryx binocularis, 58.0 mm; C) Dolichopteryx longipes, 13.4 mm; D) D. longipes 27.8 mm, lateral view & E) ventral view of same; G) Rhynchohyalus natalensis 23.0 mm. A from Schmidt (1918) as redrawn from Ahlstrom et al. (1984); B from Roule & Angel (1930); C-E from Moser (1996d); G from Bertelsen et al. 1965.



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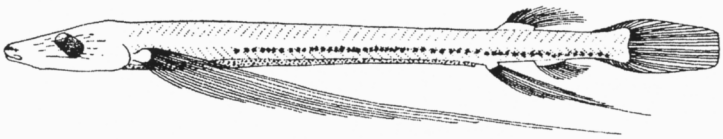

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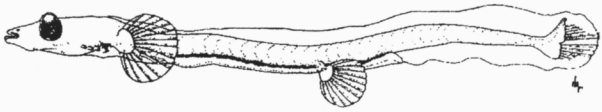

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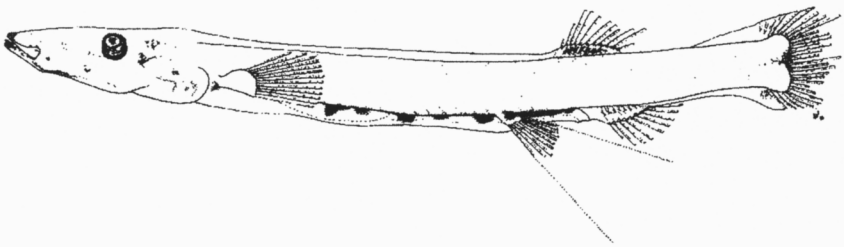

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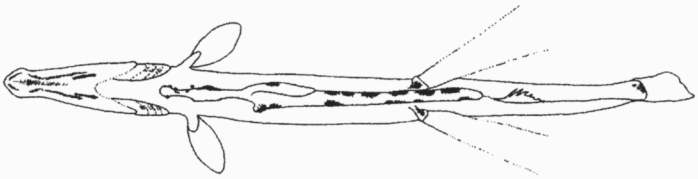

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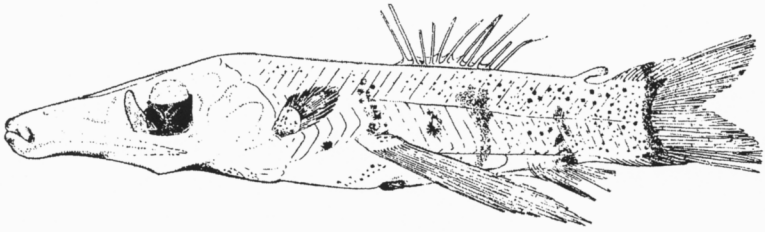

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